

Germ Plasm Evaluation Program

Progress Report No. 5

U.S. Meat Animal Research Center

**In cooperation with
Kansas State University
and the University of Nebraska**

**ARS-NC-55
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The cattle Germ Plasm Evaluation Program at the U.S. Meat Animal Research Center is designed to characterize different biological types represented by breeds varying widely in characteristics such as milk production, growth, mature size and carcass composition at various points along their growth curves. A major objective is to characterize breeds representing different biological types in different feed environments and production situations for the full spectrum of biological traits relating to economic beef production.

A coordinated research effort is employed involving scientists from different disciplines including animal breeding, reproductive physiology, nutrition, meats and management systems. The program was initiated with the 1969 breeding season. Progress reports have been published annually summarizing current results from each cycle and phase of the program for traits of principal economic importance to the beef cattle industry.

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Applicants for all Department programs will be given equal consideration without regard to race, color, sex, age, creed or national origin.

CATTLE GERM PLASM EVALUATION PROGRAM¹

PROGRESS REPORT NO. 5

U. S. MEAT ANIMAL RESEARCH CENTER

The cattle Germ Plasm Evaluation Program has been conducted in three cycles. Cycle I involved breeding Hereford, Angus, Jersey, South Devon, Limousin, Simmental and Charolais bulls by artificial insemination (AI) to Hereford and Angus cows to produce three calf crops (Cycle I, Phase 2) in the spring of 1970, 1971 and 1972.

Cycle II, initiated with the 1972 breeding season, involved the Hereford and Angus cows used in the first cycle. These cows were bred by AI to Hereford, Angus, Red Poll, Brown Swiss, Gelbvieh, Maine Anjou and Chianina sires to produce two calf crops (Cycle II, Phase 2) in the spring of 1973 and 1974. In addition, in Cycle II, Phase 2, Red Poll and Brown Swiss cows were added to the program and mated to Hereford, Angus, Red Poll and Brown Swiss sires.

Cycle III was initiated during the 1974 breeding season. In Cycle III, the Hereford and Angus cows used to initiate Cycles I and II were mated by AI to Hereford, Angus, Brahman, Sahiwal, Pinzgauer and Tarentaise sires to produce two calf crops (Cycle III, Phase 2) in the spring of 1975 and 1976.

Fifteen of the Hereford and 16 of the Angus sires used in Cycle I were also used in Cycle II and Cycle III to insure a more stable control population of Hereford and Angus reciprocal crosses that are used as a basis for comparison between different cycles and phases of the program. Within each cycle of sire breeds, foundation cows (Hereford and Angus, in Cycles I, II and III, plus Red Poll and Brown Swiss in Cycle II) are referred to as Phase 1. Their calves are called Phase 2 and the calves from Phase 2 cows are designated Phase 3. Specific mating plans for each cycle and phase of the program are given in the appendix.

Previous progress reports have presented completed data for Cycles I and II and are available by request. Progress Report No. 1 (ARS-NC-13, 1974) included birth and weaning traits of Cycle I, Phase 2 calves and postweaning growth, feed efficiency and carcass and meat traits of the steers. Progress Report No. 2 (ARS-NC-22, 1975) included the growth, reproduction and maternal performance of Cycle I, Phase 2 females through two years of age and, for Cycle II, Phase 2, the preweaning traits for both calf crops and the steer postweaning traits for the 1973 calf crop. Progress Report No. 3 (ARS-NC-41, 1976) presented a complete summary and discussion of

¹ U. S. Meat Animal Research Center, Agricultural Research Service, U. S. Department of Agriculture, Clay Center, Nebraska 68933; Standardization Branch, Agricultural Marketing Service, U. S. Department of Agriculture; Kansas State University, Manhattan; and the University of Nebraska, Lincoln; cooperating.

Cycle I, Phase 2 results from birth through slaughter for steers and from birth through puberty for the heifers. Progress Report No. 4 (ARS-NC-48, 1976) included reproduction and maternal performance of Cycle I, Phase 2 cows as 3-year-olds, preweaning and postweaning information for Cycle I, Phase 3 calves, and postweaning steer data for the 1974 calf crop and postweaning heifer data for both calf crops of Cycle II, Phase 2 calves.

This report provides reproduction and maternal performance data for Cycle I, Phase 2 cows as 4-, 5- and 6-year-olds, Cycle I, Phase 3 cows as 2-year-olds, and Cycle II, Phase 2 cows as 2- and 3-year-olds. Birth and weaning traits are reported for all Cycle II, Phase 3 and Cycle III, Phase 2 calves. Also, postweaning growth, feed efficiency and carcass and meats data of steers and growth, puberty and conception of heifers are reported from the first of two calf crops in Cycle III, Phase 2.

General releases of information on individual sires are not planned because erroneous conclusions may be drawn from the ranking of individual sires with the relatively small number of progeny per sire in this program. The objective of the program is to characterize breeds as representatives of different biological types. To do this effectively, a large sample of sires of each breed is necessary. Thus, the number of progeny per sire is generally low. A relatively large number of progeny per sire are required for a high level of accuracy in ranking individual sires on their breeding value for most economic traits.

CYCLE I, PHASE 2

Foundation Cows. The foundation Hereford and Angus cows used in the program were purchased as calves at weaning from commercial producers in Nebraska. The cows were 2 through 5 years of age, 2 through 6 years of age, and 3 through 7 years of age at calving in 1970, 1971 and 1972, respectively.

Sires. In Cycle I, 32 Hereford, 35 Angus, 33 Jersey, 28 South Devon, 20 Limousin, 28 Simmental and 26 Charolais bulls were used during the 1969, 1970 and 1971 breeding seasons. The Hereford and Angus bulls used in this program were sampled from bulls that had been selected on individual performance information which was the basis for entering into the progeny testing programs of artificial insemination organizations. The Jersey bulls were selected at random from two commercial AI organizations and the South Devon bulls were sampled from an importation made in 1969 by a commercial organization. Simmental, Limousin and Charolais bulls were sampled from bulls available from commercial organizations and from the Canada Department of Agriculture for the Simmental and Limousin.

For a cooperative study with the Canada Department of Agriculture, Hereford x Angus, Jersey x Angus, Simmental x Angus and Charolais x Angus heifers were randomly selected at weaning time and shipped, 4 to 8 weeks

after weaning, to the Research Station, Lethbridge, Alberta. There were 12 heifers per breed group in 1970 and 10 heifers per breed group in 1971 and 1972. These females and their offspring are being individually fed to evaluate efficiency of production.

Matings. Cycle I, Phase 2 yearling heifers were mated to Hereford, Angus, Brahman, Devon and Holstein bulls during a 45- to 46-day AI season and to Hereford and Angus bulls for a 21- to 24-day cleanup period in 1971, 1972 and 1973 (appendix table 3). As 2-year-old cows, they were mated to Hereford, Angus, Chianina, Gelbvieh and Maine Anjou bulls for a 42- to 45-day AI season and to Hereford and Angus bulls during a 22-day cleanup in 1972, 1973 and 1974. As 3-, 4-, 5- and 6-year-olds, the cows are being mated by natural service to Brown Swiss bulls for 63 days.

Data Analysis. Calving difficulty, calf mortality, calf birth weight and preweaning growth were analyzed by least-squares procedures for unequal subclass numbers using a model that included the effects of breed of cow's sire, breed of cow's dam, cow age-year, sex and two-way interactions. Birth and 200-day weight and preweaning growth rate were adjusted to a steer basis by adjustment factors calculated from the data and shown in the table footnotes. Unweighted means are presented for calf crop percentage, postpartum interval and pregnancy rate.

Calving Difficulty. Calving difficulty scores were assigned to each calf at birth on the basis of the following system:

Score

- | | |
|-------------------------|--|
| 1 No difficulty | - Calves unassisted. |
| 2 Little difficulty | - Assistance given by hand, but no jack or puller used; assistance actually may not have been required. |
| 3 Moderate difficulty | - Assistance given with jack or calf-puller; some difficulty was encountered even with the pullers being used. |
| 4 Major difficulty | - Calf jack used and major difficulty encountered; usually 30 minutes or more required to deliver calf. |
| 5 Caesarean birth | - Performed after determination made that calf could not be delivered with a calf-puller. |
| 6 Abnormal presentation | - Assistance given: posterior, head back, leg back, etc. |

Summaries of calving difficulty in 1382 births from 4-, 5- and 6-year-old cows are provided in table 1. For these summaries, scores of 1 and 2 were combined and are designated no difficulty and scores of 3 and 4 are combined and are designated calf-puller.

Reproductive and Maternal Performance. Information is presented on the rebreeding performance of 4-, 5- and 6-year-olds in table 2. Least squares means for cow weight at fall palpation time and fall hip height measurements are also included in these tables. Preweaning growth and calf crop percentages are provided in table 1 for calves from these same cows.

CYCLE I, PHASE 3

Matings. The mating plans to produce Cycle I, Phase 3 calves are shown in appendix table 3. As yearling heifers, the Cycle I, Phase 2 females were bred by AI to 16 Hereford, 25 Angus, 14 Brahman, 12 Devon and 13 Holstein sires for 45 to 46 days followed by a 21- to 24-day cleanup mating period to Hereford and Angus sires to produce their first calf crops as 2-year-olds in the spring of 1972, 1973 and 1974. Birth, survival, preweaning growth and postweaning steer and heifer data for the Cycle I, Phase 3 calves were reported previously (ARS-NC-48, Progress Report No. 4, 1976). In addition, the females were retained and are being evaluated for maternal and reproductive performance when mated naturally to Red Poll bulls. Calf birth, survival and preweaning growth and cow rebreeding performance as 2-year-olds are reported in tables 3 and 4 by breed of the cow's dam and in tables 5 and 6 by breed of the cow's sire.

Data Analysis. Calving difficulty, calf mortality, birth weight and preweaning growth were analyzed by least squares procedures for unequal subclass numbers using a model that included the effects of breed of cow's grandsire, breed of cow's granddam, breed of cow's sire, year, sex and two-way interactions. Birth and 200-day weight and preweaning growth rate were adjusted to a steer basis by adjustment factors calculated from the data and shown in table footnotes. Unweighted means are presented for calf crop percentage and pregnancy rate. Cow weights (tables 4 and 6) are least squares means from an analytical model similar to the one used for calf traits except that sex was omitted.

CYCLE II, PHASE 2

Cows. The foundation Hereford and Angus cows used in Cycle I were continued in Cycle II of the program. The cows calving in 1973 were 4 to 8 years of age and in 1974 were 4 to 9 years of age. As previously indicated, mature Brown Swiss and Red Poll cows were added to these herds for the 1972 and 1973 breeding seasons.

Sires. In Cycle II, 15 Hereford, 16 Angus, 16 Red Poll, 11 Brown Swiss, 11 Gelbvieh, 18 Maine Anjou and 20 Chianina bulls were used during the 1972 and 1973 breeding seasons. The Hereford and Angus sires had also been used in Cycle I of the program and the other bulls were sampled from commercial organizations. The Brown Swiss sires included four domestic bulls and seven bulls imported into Canada from Switzerland and Germany.

Birth, Preweaning and Postweaning Data. Data on calving difficulty and preweaning growth for both calf crops produced (1973-74) and postweaning growth, feed efficiency and carcass and meat traits for the first calf crop of Cycle II, Phase 2 were summarized previously (ARS-NC-22, Progress Report No. 2, 1975). In addition, steer postweaning data from the second calf crop and heifer postweaning growth, puberty and conception for both calf crops were reported previously (ARS-NC-48, Progress Report No. 4, 1976).

Calving and Rebreeding of 2-Year-Olds. Data on calving difficulty, calf crop percentage and birth and weaning weights of calves from 2-year-old dams (born in 1973-74) are presented in table 7 for cows out of Hereford and Angus dams. Data on rebreeding performance and size as 2-year-olds are given in table 8. Corresponding data are reported in tables 11 and 12 for the cows by Hereford, Angus, Red Poll and Brown Swiss sires. The Cycle II, Phase 2 yearling heifers were bred by AI to calve as 2-year-olds to Hereford, Angus, Brangus and Santa Gertrudis bulls (appendix table 4). After calving as 2-year-olds, they were rebred by natural service to 3/4 Simmental bulls.

Calving difficulty, calf mortality, calf birth weight and preweaning growth were analyzed by least squares procedures for unequal subclass numbers using a model that included the effects of breed of dam's sire, breed of dam's dam, breed of calf's sire, sex, year and two-way interactions. Birth and 200-day weight and preweaning growth rate were adjusted to a steer basis by adjustment factors calculated from the data and shown in table footnotes. Unweighted means are presented for calf crop percentage, postpartum interval and pregnancy rate.

Calving and Rebreeding of 3-Year-Olds. Data on calving difficulty, calf crop percentage and birth and weaning weights of calves from 3-year-old dams (born in 1973) are presented in table 9 for cows out of Hereford and Angus dams. Data on rebreeding performance and size as 3-year-olds are given in table 10. Corresponding data are reported in tables 13 and 14 for the cows by Hereford, Angus, Red Poll and Brown Swiss sires. The cows were bred as 2- and 3-year-olds by natural service to 3/4 Simmental bulls. Data analysis was the same as for the 2-year-olds except breed of calf's sire was omitted.

CYCLE II, PHASE 3

Sires. The mating plans to produce Cycle II, Phase 3 calves are presented in appendix table 4. There were 13 Hereford, 14 Angus, 13 Santa Gertrudis and 14 Brangus sires used by AI to produce the two calf crops (1975-76). These sires were sampled from commercial organizations, with the Hereford and Angus sires being the same as used in other cycles and phases of the program. Calves resulting from cleanup matings to Hereford and Angus sires were also included in this summary.

Calving Difficulty and Calf Survival. Calving difficulty and calf survival (table 15) of 482 calves were analyzed by least squares procedures with a model that included breed of dam's sire, breed of dam's dam, breed of calf's sire, sex, year and two-way interactions. Calves resulting from cleanup matings to Hereford and Angus sires were classified as a different sire breed than those resulting from AI matings. The same system of scoring calving difficulty was used as described for other cycles and phases of the program.

Prewaning Growth. Prewaning growth data (table 16) for 392 calves were analyzed by the same analytical model as calving difficulty. The data were adjusted to a steer basis using adjustment factors calculated from the data and given in the footnote of table 16.

Postweaning Data. Growth and carcass data on steers and growth, puberty and pregnancy data on heifers is being obtained and will be reported next year after data for both calf crops are available. In addition, females are being retained to evaluate maternal and reproductive performance.

CYCLE III, PHASE 2

Cows. The foundation Hereford and Angus cows used to produce Phase 2 calves in Cycles I and II were continued in Cycle III of the program (appendix table 5). The two calf crops in Cycle III, Phase 2 were produced in 1975 and 1976.

Sires. There were 13 Hereford, 16 Angus, 17 Brahman, 6 Sahiwal, 9 Pinzgauer and 7 Tarentaise sires used during the 1974 and 1975 breeding seasons. The Hereford and Angus bulls had also been used in Cycle I and Cycle II of the program and the Brahman bulls were sampled from commercial organizations or purebred Brahman herds. Semen was available from only 2 Sahiwal bulls (imported from Australia) and 1 Tarentaise bull for the 1974 breeding season. Semen was available on 4 additional Sahiwal bulls and 6 additional Tarentaise bulls for the 1975 breeding season to produce the second Cycle III, Phase 2 calf crop in 1976.

A sample of about 32 heifers from each of the Angus-Hereford, Hereford-Angus, Brahman-Hereford, Brahman-Angus, Sahiwal-Hereford, Sahiwal-Angus, Pinzgauer-Hereford and Pinzgauer-Angus breed groups were transferred to the Agricultural Research Service, U. S. Department of Agriculture Station at Brooksville, Florida, for an interregional study cooperative with the Florida Agricultural Experiment Station to evaluate genotype-environment interactions involving maternal traits. These heifers and those remaining at the U. S. Meat Animal Research Center will be mated by natural service to bulls sampled from the same population of Red Poll (for first calf crop) and 7/8 Simmental (second through fourth calf crops) to evaluate reproduction and maternal performance in each environment.

Calving Difficulty. Calving difficulty (table 17) of 1608 calves was analyzed by least squares procedures that included the effects of breed of sire, breed of dam, age of dam, sex, year and most two-way interactions. The same system of scoring calving difficulty was used as described above for Cycle I.

Prewaning Growth. Prewaning growth data available on 1518 calves (table 18) were analyzed using the same analytical model as for calving difficulty. The data were adjusted to a steer basis with the adjustment factors computed from the data. The adjustment factors are presented in the footnote of table 18.

Postweaning Growth and Feed Efficiency. Postweaning growth and feed efficiency data obtained on 452 steers from the 1976 calf crop are summarized in table 20. Rations are presented in table 19. The steers were serially slaughtered as described in the carcass and meats section.

The steers were weaned in late October at about 200 days of age. At weaning, steer calves with adjusted weaning weights more than three standard deviations below the mean for their breeding group were removed from the program. There were few calves in this category. The remaining steers were placed in the feedlot for a 40-day adjustment period and then separated into replicated pens by sire breed with the Hereford-Angus reciprocal crosses combined. Hereford-Angus, Brahman and Pinzgauer crosses were fed in three pens; Sahiwal and Tarentaise crosses were fed in two pens.

The postweaning average daily gains are based on actual weaning weights (no weaning shrink) and final weights at slaughter. Final weights at slaughter were obtained as the average of two weights (on feed and water) taken on different days to reduce errors due to differences in fill. Average daily gains and final weights for the different slaughter groups are for only the steers slaughtered in that group. Feed efficiency for each breed group was obtained by dividing the cumulative average daily TDN consumption per steer by the average daily gain of the

steers remaining on feed up to each of the slaughter dates. The measurement of feed efficiency began after a 40-day conditioning period. Metabolizable energy (Mcal) was obtained by multiplying pounds TDN by 1.64. TDN contents of the diets were estimated by the use of TDN values for the component feed-stuffs (National Research Council) and in most cases laboratory determined dry matter and crude protein.

Postweaning growth was analyzed by least squares procedures for unequal subclass numbers using a model that included the effects of slaughter group, breed of sire, breed of dam within slaughter group and two-way interactions.

Carcass and Meats. The 1975-born steers were serially slaughtered in three groups after 192, 218 and 246 days on feed following the 40-day postweaning adjustment period. Steers were transported to a commercial slaughter plant approximately 12 hours before slaughter. Carcass data were obtained after a 24-hour chill. Carcasses were evaluated for maturity, marbling and USDA Quality Grade (as revised, 1976) by representatives of the U. S. Meat Animal Research Center; Standardization Branch, Agricultural Marketing Service, USDA; and Kansas State University. Ribeye area and 12th rib fat thickness were measured and USDA Yield Grade determined. These results are presented in tables 21 and 22.

After obtaining carcass cooler data, the right side of each carcass of an average of 24 steers per sire breed by slaughter group subclass for all sire breeds except Tarentaise (only 14 per slaughter group) was transported from the commercial slaughter plant to Kansas State University for detailed cut-out and meat quality evaluation. The right side was separated into wholesale cuts which were processed into closely trimmed, boneless retail cuts, except that dorsal and transverse spinous processes were left in short loin cuts and dorsal spinous processes and rib bones were left in rib cuts. No more than 0.30 inch of fat was left on any surface. The amounts of retail product, fat trim and bone were determined for each wholesale cut. These results are presented in table 23.

One steak was removed at the 11th rib from each carcass for Warner-Bratzler shear determinations of tenderness. The steaks were cooked at 350° F to an internal temperature of 150° F. After cooling for approximately 30 minutes at room temperature, one-half inch cores were removed for shear determination. Steaks were removed at the 10th rib from six representative carcasses per breed group per slaughter date, cooked at 350° F to an internal temperature of 150° F, and subjected to taste panel evaluation for tenderness, flavor, juiciness and overall acceptability by trained taste panelists. These results are presented in table 24.

The data for the carcass and meat traits were analyzed by least squares procedures for unequal subclass numbers using the same model as used for postweaning growth.

Postweaning Growth, Puberty and Conception. Postweaning growth, age at puberty and conception of yearling heifers born in 1975 are presented in table 25. The heifers were developed in the feedlot from weaning in October until April 19. The postweaning ration was 50% corn silage, 30% alfalfa haylage and 20% sorghum silage fed free choice. The heifers grazed on cool and warm season pastures during a 63-day, natural-service breeding season that began May 17.

Heifers were observed for estrus twice daily from an average of about 240 days of age through the end of the breeding season at about 16 months of age. Date of puberty was defined as the date of the first observed standing estrus confirmed by a second observed estrus within 45 days. Puberty weight was calculated by interpolation between the nearest two weights. Data on the postweaning growth, puberty and conception of these heifers (table 25) were analyzed by least squares procedures using a model that included breed of sire, breed of dam and their interaction.

Adjusted values were determined for age and weight at puberty for each breed group because estrus was not detected in all animals. The observed average ages and weights at puberty were biased downward by differing degrees, depending upon the percentage of heifers detected in estrus by the end of the breeding season. The mean age (or weight) at puberty was adjusted by subtracting $i\sigma$, where i is the expected (negative) deviation in σ (standard deviation) units from the true mean for the selected sample of observed ages (or weights) at puberty.

TABLE 1. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY, CALF CROP PERCENTAGE, CALF MORTALITY, BIRTH WEIGHT & WEANING WEIGHT OF CALVES FROM 4,5 & 6 YEAR-OLD COWS^a
CYCLE I, PHASE 2 - COWS BORN IN 1970-71-72.

Breed of Cow		No. Calves Born	Type of Parturition, %				Calf Crop, % ^c		Calf Mortality, % ^d		Calf Wt., lb. ^e	
Sire	Dam		No Diff. ^b	Calf- Puller	C- Section	Abn. Pre- sentation	Born	Weaned	Early	Late	Birth	200- Day
Angus Hereford	Hereford	126	94.8	3.3	0.8	1.1	94.4	91.1	3.4	1.5	91.6	470
	Angus	116	96.9	0.8	0.0	2.4	97.7	91.5	0.8	1.6	90.5	486
	Average	242	95.8	2.0	0.4	1.7	96.1	91.3	2.1	1.6	91.0	478
Jersey	Hereford	118	97.1	2.1	0.0	0.8	95.2	87.2	4.2	3.7	85.5	502
	Angus	84	97.5	1.1	0.0	1.4	90.3	81.7	4.8	4.7	79.7	492
	Average	202	97.3	1.6	0.0	1.1	93.1	84.9	4.5	4.2	82.6	497
South Devon	Hereford	92	94.0	2.4	1.2	2.5	94.9	91.8	0.0	2.4	97.2	498
	Angus	86	92.2	3.3	0.0	4.5	93.5	90.2	0.9	1.9	91.4	489
	Average	178	93.1	2.8	0.6	3.5	94.2	91.1	0.5	2.1	94.3	494
Limousin	Hereford	127	96.1	3.0	0.3	0.6	94.2	87.6	5.2	2.0	93.7	487
	Angus	138	91.0	4.6	0.9	3.6	98.6	91.0	6.5	0.7	90.7	478
	Average	265	93.5	3.8	0.6	2.1	96.5	89.4	5.8	1.3	92.2	482
Simmental	Hereford	148	91.0	7.1	0.1	1.9	98.1	94.2	2.9	1.5	96.8	528
	Angus	123	95.3	3.1	0.0	1.7	93.9	87.1	6.7	1.3	92.4	520
	Average	271	93.1	5.1	0.0	1.8	96.2	90.9	4.8	1.4	94.6	524
Charolais	Hereford	145	89.6	5.0	3.0	2.4	97.2	85.5	8.3	2.6	96.9	507
	Angus	79	96.3	3.6	0.0	0.0	88.9	82.2	3.5	2.4	96.6	505
	Average	224	93.0	4.3	1.5	1.2	94.0	84.3	5.9	2.5	96.8	506
Average	Hereford	756	93.7	3.8	0.9	1.5	95.8	89.5	4.0	2.3	93.6	499
All Sire	Angus	626	94.9	2.7	0.2	2.2	94.4	87.8	3.9	2.1	90.2	495
Breeds	Average	1382	94.3	3.3	0.5	1.9	95.2	88.7	3.9	2.2	91.9	497

^a Calves from these cows were sired by Brown Swiss bulls (appendix table 3).

^b No assistance or minor hand assistance.

^c Of cows alive at calving; cows removed from experiment only for serious injury, being open two successive years or by death.

^d Early mortality is within 72 hr of birth; late is from 72 hr after birth until weaning.

^e Adjusted to a steer basis. Least-squares adjustment factors for heifers were 6.5 lb. for birth weight and 29 lb. for 200-day weight.

TABLE 2. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DATE, REBREEDING PERFORMANCE AND SIZE OF COWS CALVING AS 4-, 5- AND 6-YEAR-OLDS
CYCLE I, PHASE 2 - COWS BORN IN 1970-71-72

Breed of Cow		No. Calving as			Avg. Calving Date	Postpartum Interval, Days ^a	Percent Pregnant ^b	Cow Weight, lb.			Hip Height, in.		
Sire	Dam	4-Yr.- Olds	5-Yr.- Olds	6-Yr.- Olds				4½ Yrs.	5½ Yrs.	6½ Yrs.	4½ Yrs.	5½ Yrs.	6½ Yrs.
Angus Hereford	Hereford	60	44	22	April 8	60.3	96.6	1023	1064	1049	47.7	48.1	46.1
	Angus	55	42	19	April 5	53.9	96.0	1036	1070	1093	47.7	48.1	47.9
	Average	115	86	41	April 7	57.0	96.3	1030	1067	1071	47.7	48.1	47.0
Jersey	Hereford	52	42	24	April 1	60.1	95.8	899	966	950	48.1	48.4	48.3
	Angus	45	29	10	March 29	59.0	88.0	899	932	948	47.2	47.5	47.0
	Average	97	71	34	March 31	59.6	92.6	899	949	949	47.7	47.9	47.6
South Devon	Hereford	51	29	12	April 10	58.6	93.6	1068	1105	1132	49.7	50.2	50.0
	Angus	40	33	13	April 3	61.2	96.5	1074	1117	1108	49.5	49.7	50.0
	Average	91	62	25	April 6	59.8	95.0	1071	1111	1120	49.6	49.9	50.0
Limousin	Hereford	67	35	25	April 11	55.4	96.9	1059	1111	1112	50.0	50.2	49.8
	Angus	71	41	26	April 4	64.6	96.5	1046	1100	1108	49.3	49.5	49.2
	Average	138	76	51	April 7	60.5	96.7	1052	1106	1110	49.6	49.9	49.5
Simmental	Hereford	79	48	21	April 10	57.5	95.4	1092	1138	1160	50.6	51.0	51.0
	Angus	58	43	22	April 6	60.7	94.4	1073	1128	1105	49.8	50.2	50.0
	Average	137	91	43	April 8	58.9	94.9	1083	1133	1133	50.2	50.6	50.5
Charolais	Hereford	68	47	30	April 9	55.5	94.3	1151	1197	1190	50.3	50.5	50.4
	Angus	43	25	11	April 8	57.2	93.8	1157	1197	1217	50.0	50.7	50.9
	Average	111	72	41	April 8	56.2	94.1	1154	1197	1203	50.2	50.6	50.6
Average All Sire Breeds	Hereford	377	245	134	April 8	57.8	95.5	1049	1097	1099	49.4	49.7	49.3
	Angus	312	213	101	April 4	59.7	94.5	1047	1091	1096	48.9	49.3	49.1
	Average	689	458	235	April 6	58.7	95.0	1048	1094	1098	49.2	49.5	49.2

^a Interval from calving to first estrus. Data on 4-year-old cows only.

^b Breeding period was 63 days by natural service to Brown Swiss bulls (appendix table 3). Percent pregnant = no. palpated as pregnant ÷ no. palpated, and only includes cows that calved prior to breeding.

TABLE 3. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
 CALVING DIFFICULTY, CALF MORTALITY, BIRTH AND WEANING WEIGHT, AND PREWEANING ADG OF CALVES FROM 2-YEAR-OLD COWS^{a,b}
 CYCLE I, PHASE 3 - COWS BORN 1972, 73, 74

Breed of Dam of Cow		No. Calves Born	Type of Parturition, %				Calf Mortality ^d		Calf Wt., lb. ^e			
Sire	Dam		No ^c Diff.	Calf- Puller	C- Section	Abn. Pre- sentation	Early	Late	Birth	200- Day	Prewn. ADG, lb.	200-Day ^f Wt. Ratio
Angus Hereford	Hereford	16	75.0	14.2	11.1	0.0	0.5	0.0	76.5	425	1.74	101.4
	Angus	20	49.0	45.4	1.9	3.7	15.7	6.0	75.1	413	1.71	98.6
	Average	36	62.0	29.8	6.5	1.7	8.1	2.0	75.8	419	1.73	100.0
Jersey	Hereford	23	56.1	46.0	0.0	0.0	8.2	2.7	75.9	463	1.92	110.5
	Angus	21	45.9	50.0	1.4	2.6	18.2	0.0	70.5	439	1.82	104.8
	Average	44	51.0	48.0	0.2	0.8	13.2	0.4	73.2	451	1.87	107.6
South Devon	Hereford	17	87.0	13.3	0.6	0.0	6.9	7.4	75.5	414	1.71	98.8
	Angus	17	56.2	38.8	5.3	0.0	8.7	16.1	79.4	443	1.83	105.7
	Average	34	71.6	26.1	2.9	0.0	7.8	11.7	77.5	429	1.77	102.4
Limousin	Hereford	13	81.7	11.1	0.3	6.9	0.1	10.0	76.7	401	1.63	95.7
	Angus	24	66.8	35.4	0.0	0.0	6.5	4.1	71.7	417	1.71	99.5
	Average	37	74.3	23.2	0.0	2.6	3.3	7.1	74.2	409	1.67	97.6
Simmental	Hereford	27	71.2	27.0	1.5	0.4	9.2	12.4	78.1	456	1.89	108.8
	Angus	17	73.4	24.5	3.2	0.0	10.2	0.0	75.5	461	1.92	110.0
	Average	44	72.3	25.7	2.3	0.0	9.7	5.9	76.8	458	1.91	109.3
Charolais	Hereford	28	66.4	34.9	0.0	0.0	8.8	5.4	81.6	446	1.83	106.4
	Angus	12	48.4	47.1	5.8	0.0	7.2	0.0	83.3	462	1.89	110.3
	Average	40	57.4	41.0	2.9	0.0	8.0	2.1	82.4	454	1.86	108.4
Average	Hereford	124	72.9	24.4	2.1	0.6	5.6	6.0	77.4	434	1.79	103.6
All Sire	Angus	111	56.6	40.2	2.9	0.3	11.1	3.7	75.9	439	1.82	104.8
Breeds	Average	235	64.8	32.3	2.5	0.5	8.3	4.9	76.6	437	1.80	104.3

^a These cows were sired by Angus, Hereford, Brahman, Devon and Holstein bulls (appendix table 3).

^b Calves from these cows were sired by Red Poll bulls.

^c No assistance or minor hand assistance.

^d Early mortality is within 72 hr of birth; late is from 72 hr after birth until weaning.

^e Adjusted to a steer basis. Least-squares adjustment factors for heifers were 4.3 lb. for birth weight and 29 lb. for 200-day weight.

^f Ratio computed relative to 419 lb. average for Hereford and Angus sired calves.

TABLE 4. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALF CROP PERCENTAGE, CALVING DATE, REBREEDING PERFORMANCE AND SIZE OF COWS CALVING AS 2-YEAR-OLDS^a
CYCLE I, PHASE 3 - COWS BORN IN 1972, 73, 74

Breed of Dam of Cow		No. Calving as 2-Year-Olds	Calf Crop, % ^b		Avg. Calving Date	Percent Pregnant ^c	Cow Wt. at 2½ Yrs. of Age, lb.
Sire ¹	Dam		Born	Weaned			
Angus Hereford	Hereford	16	88.9	88.9	April 7	87.5	882
	Angus	20	87.0	65.2	April 2	95.0	905
	Average	36	87.8	75.6	April 5	91.7	894
Jersey	Hereford	23	95.8	87.5	March 26	95.7	890
	Angus	21	100.0	90.5	March 24	100.0	869
	Average	44	97.8	88.9	March 25	97.7	879
South Devon	Hereford	17	81.0	76.2	April 2	94.1	946
	Angus	17	89.5	73.7	April 3	94.1	894
	Average	34	85.0	75.0	April 2	94.1	920
Limousin	Hereford	13	82.4	64.7	April 8	92.9	853
	Angus	24	83.3	73.3	March 30	100.0	908
	Average	37	83.0	70.2	April 4	97.4	881
Simmental	Hereford	27	90.6	71.9	March 29	86.2	953
	Angus	17	100.0	88.2	March 22	88.2	949
	Average	44	93.9	77.6	March 26	87.0	951
Charolais	Hereford	28	96.7	76.7	April 7	89.7	973
	Angus	12	81.3	62.5	April 6	84.6	960
	Average	40	91.3	71.7	April 7	88.1	966
Average All Sire Breeds	Hereford	124	90.1	77.5	April 3	90.6	916
	Angus	111	89.7	75.4	March 30	94.7	914
	Average	235	89.9	76.5	April 1	92.5	915

^a

These cows were sired by Angus, Hereford, Brahman, Devon and Holstein bulls.

^b

Of heifers exposed to breeding and alive at fall palpation.

^c

The average breeding period was 56 days by natural service to Red Poll bulls. Percent pregnant = no. palpated as pregnant ÷ no. palpated and only includes cows that calved prior to breeding.

TABLE 5. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY, CALF MORTALITY, BIRTH AND WEANING WEIGHT, AND PREWEANING ADG OF CALVES FROM 2-YEAR-OLD COWS^{a,b}
CYCLE I, PHASE 3 - COWS BORN 1972, 73, 74

Breed of Cow		No. Calves Born	Type of Parturition, %				Calf ^d Mortality		Calf Wt., lb. ^e			
Sire	Dam		No. Diff. ^c	Calf- Puller	C- Section	Abn. Presen- tation	Early	Late	Birth	200- Day	Prenn. ADG, lb.	200-Day ^f Wt. Ratio
Angus Hereford	Hereford-Crosses	44	64.8	30.2	3.3	1.7	12.6	0.0	73.7	397	1.62	99.0
	Angus-Crosses	46	41.8	48.5	8.5	1.2	5.0	1.5	75.1	404	1.66	100.7
	Average	90	53.3	39.3	5.9	1.5	8.8	0.0	74.4	401	1.64	100.0
Brahman	Hereford-Crosses	26	93.0	8.8	0.0	0.1	1.9	19.3	75.0	459	1.92	114.5
	Angus-Crosses	17	86.8	12.2	3.6	0.0	4.6	3.0	69.7	473	2.00	118.0
	Average	43	89.9	10.5	0.8	0.0	3.2	11.1	72.3	466	1.96	116.2
Devon	Hereford-Crosses	29	63.6	33.7	3.5	0.0	7.8	0.8	76.1	406	1.65	101.2
	Angus-Crosses	28	54.2	42.5	0.0	3.8	28.0	4.1	72.9	411	1.68	102.5
	Average	57	58.9	38.1	1.5	1.5	17.9	2.5	74.5	408	1.67	101.7
Holstein	Hereford-Crosses	25	70.2	25.0	3.4	1.4	0.1	5.3	84.7	475	1.96	118.5
	Angus-Crosses	20	43.7	57.7	0.0	0.0	6.8	6.4	86.0	470	1.93	117.2
	Average	45	56.9	41.4	1.6	0.1	3.4	5.8	85.3	472	1.94	117.7
Average All Sire Breeds	Hereford-Crosses	124	72.9	24.4	2.1	0.6	5.6	6.0	77.4	434	1.79	108.2
	Angus-Crosses	111	56.6	40.2	2.9	0.3	11.1	3.7	75.9	439	1.82	109.5
	Average	235	64.8	32.3	2.5	0.5	8.3	4.9	76.6	437	1.80	109.0

^a The dams of these cows were sired by Angus, Hereford, Jersey, South Devon, Limousin, Simmental and Charolais bulls.

^b These cows were bred to Red Poll bulls.

^c No assistance or minor hand assistance.

^d Early mortality is within 72 hr of birth; late is from 72 hr after birth until weaning.

^e Adjusted to a steer basis. Least-squares adjustment factors for heifers were 4.3 lb. for birth weight and 29 lb. for 200-day weight.

^f Ratio computed relative to 401 lb. average for Hereford and Angus sired calves.

TABLE 6. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALF CROP PERCENTAGE, CALVING DATE, REBREEDING PERFORMANCE AND SIZE OF COWS CALVING AS 2-YEAR-OLDS^a
CYCLE I, PHASE 3 - COWS BORN IN 1972, 73, 74

Breed of Cow		No. Calving as 2-Year-Olds	Calf Crop, % ^b		Avg. Calving Date	Percent ^c Pregnant	Cow Wt. at 2½ Yrs. of Age, lb.
Sire	Dam		Born	Weaned			
Angus Hereford	Hereford-Crosses	44	89.8	73.5	March 30	86.4	873
	Angus-Crosses	46	87.0	79.6	March 29	91.5	870
	Average	90	88.4	76.7	March 29	89.0	871
Brahman	Hereford-Crosses	26	83.9	70.1	April 14	92.3	961
	Angus-Crosses	17	100.0	88.2	April 2	100.0	940
	Average	43	89.6	77.1	April 8	95.4	950
Devon	Hereford-Crosses	29	88.2	76.5	April 3	93.3	882
	Angus-Crosses	28	87.9	63.6	March 27	96.6	907
	Average	57	88.1	70.2	March 30	94.9	895
Holstein	Hereford-Crosses	25	100.0	92.9	March 27	92.9	949
	Angus-Crosses	20	90.9	72.7	April 1	95.0	940
	Average	45	96.0	84.0	March 30	93.8	945
Average All Sire Breeds	Hereford-Crosses	124	90.1	77.5	April 3	90.6	916
	Angus-Crosses	111	89.7	75.4	March 30	94.7	914
	Average	235	89.9	76.5	April 1	92.5	915

^a The dams of these cows were sired by Angus, Hereford, Jersey, South Devon, Limousin, Simmental and Charolais bulls.

^b Of heifers exposed to breeding and alive at fall palpation.

^c The breeding period was 56 days by natural service to Red Poll bulls. Percent pregnant = no. palpated as pregnant ÷ no. palpated and only includes cows that calved prior to breeding.

TABLE 7. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY, CALF CROP PERCENTAGE, CALF MORTALITY, BIRTH WEIGHT AND WEANING WEIGHT OF CALVES FROM 2-YEAR-OLD COWS^a
CYCLE II, PHASE 2 - COWS BORN 1973-74

Breed of Cow		No. Calves Born	Type of Parturition, %				Calf Crop, % ^c		Calf Mortality, % ^d		Calf Wt., lb. ^e	
Sire	Dam		No. Diff. ^b	Calf-Puller	C-Section	Abn. Pre-sentation	Born	Weaned	Early	Late	Birth	200-Day
Angus Hereford	Hereford	30	45.8	47.3	3.5	3.4	89.7	79.5	3.9	0.0	75.1	405
	Angus	31	46.0	50.6	0.3	3.0	75.5	59.2	24.4	0.6	75.9	402
	Average	61	45.9	49.0	1.9	3.2	81.8	68.2	14.2	0.0	75.5	403
Red Poll	Hereford	36	20.0	64.1	8.8	7.1	86.1	69.8	15.7	5.4	83.9	422
	Angus	43	33.4	52.3	8.1	6.2	81.1	62.3	14.3	8.1	80.2	423
	Average	79	26.7	58.2	8.5	6.7	83.3	65.6	15.0	6.7	82.1	423
Brown Swiss	Hereford	61	62.5	31.8	4.0	1.7	95.4	73.9	14.7	6.9	81.0	457
	Angus	55	65.8	29.0	1.9	3.3	88.9	77.8	13.8	0.0	81.4	466
	Average	116	64.1	30.4	2.9	2.5	92.2	75.8	14.3	3.0	81.2	461
Gelbvieh	Hereford	35	46.4	42.5	8.5	2.6	92.1	79.0	9.0	6.5	80.7	456
	Angus	36	42.9	43.9	11.0	2.2	90.0	77.5	4.8	11.3	84.7	471
	Average	71	44.7	43.2	9.8	2.4	91.0	78.2	6.9	8.9	82.7	463
Maine Anjou	Hereford	35	43.5	53.7	0.0	3.6	92.1	76.3	13.8	3.2	85.9	448
	Angus	46	42.4	49.4	4.8	3.4	93.8	81.3	12.7	3.1	86.4	436
	Average	81	43.0	51.6	2.0	3.5	93.0	79.1	13.2	3.2	86.1	462
Chianina	Hereford	35	55.9	38.7	1.7	3.7	80.0	68.9	6.1	7.4	84.8	438
	Angus	39	54.5	29.5	13.2	2.8	87.0	78.3	4.6	3.4	85.3	441
	Average	74	55.2	34.1	7.4	3.2	83.5	73.6	5.4	5.4	85.0	440
Average All Sire Breeds	Hereford	232	45.7	46.4	4.3	3.7	89.6	74.3	10.5	4.8	81.9	438
	Angus	250	47.5	42.4	6.6	3.5	86.0	72.6	12.4	4.3	82.3	440
	Average	482	46.6	44.4	5.4	3.6	87.0	73.4	11.5	4.5	82.1	439

^a

Calves from these cows were sired by Hereford, Angus, Brangus and Santa Gertrudis bulls (appendix table 4).

^b

No assistance or minor hand assistance.

^c

Of cows alive at calving; cows removed from experiment only for serious injury or by death.

^d

Early mortality is within 72 hr of birth; late is from 72 hr after birth until weaning.

^e

Adjusted to a steer basis. Least-squares adjustment factors for heifers were 8.1 lb. for birth weight and 28 lb. for 200-day weight.

TABLE 8. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DATE, REBREEDING PERFORMANCE AND SIZE OF COWS CALVING AS 2-YEAR-OLDS
CYCLE II, PHASE 2 - COWS BORN IN 1973, 1974

Breed of Cow		No. Calving as 2-Year-Olds	Avg. Calving Date	Postpartum Interval, Days ^a	Percent Pregnant ^b	Cow Wt. at 2½ Yrs. of Age, lb.	Hip Ht. at 2½ Yrs. of Age, in.
Sire	Dam						
Angus	Hereford	30	March 26	72.3	85.7	939	47.1
Hereford	Angus	31	March 25	65.4	94.7	914	46.6
	Average	61	March 25	68.6	90.4	927	46.9
Red Poll	Hereford	36	March 27	68.4	83.8	879	47.6
	Angus	43	March 25	67.5	90.7	870	47.0
	Average	79	March 26	67.9	87.5	874	47.3
Brown Swiss	Hereford	61	March 27	73.0	90.3	935	49.3
	Angus	55	March 25	71.2	96.4	938	49.0
	Average	116	March 26	72.1	93.2	937	49.1
Gelbvieh	Hereford	35	March 27	68.2	97.1	978	49.5
	Angus	36	March 26	60.1	100.0	979	48.8
	Average	71	March 26	64.1	98.6	979	49.1
Maine Anjou	Hereford	35	March 27	69.5	94.3	1019	50.1
	Angus	46	March 25	70.7	91.3	1008	49.4
	Average	81	March 26	70.2	92.6	1013	49.8
Chianina	Hereford	35	April 2	74.1	88.9	1022	52.9
	Angus	39	March 24	78.2	90.0	1022	52.2
	Average	74	March 28	76.4	89.5	1022	52.6
Average	Hereford	232	March 28	71.0	90.0	962	49.4
All Sire	Angus	250	March 25	69.2	93.8	955	48.8
Breeds	Average	482	March 26	70.1	92.0	959	49.1

^a

Interval from calving to first estrus.

^b

Breeding period was 63 days by natural service to 3/4 Simmental bulls (appendix table 4). Percent pregnant = no. palpated as pregnant ÷ no. palpated, and only include cows that calved prior to breeding.

TABLE 9. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY, CALF CROP PERCENTAGE, CALF MORTALITY, BIRTH WEIGHT AND WEANING WEIGHT OF CALVES FROM 3-YEAR-OLD COWS^a
CYCLE II, PHASE 2 - COWS BORN IN 1973

Breed of Cow		No. Calves Born	Type of Parturition, % ^b				Calf Crop, % ^c		Calf Mortality, % ^d		Calf Wt., lb. ^e	
Sire	Dam		No Diff.	Calf- Puller	C- Section	Abn. Pre- sentation	Born	Weaned	Early	Late	Birth	200- Day
Angus	Hereford	15	72.0	21.1	0.0	6.9	73.7	68.4	0.0	7.1	81.5	454
Hereford	Angus	18	83.3	17.4	0.0	0.0	95.0	90.0	0.0	4.4	82.4	435
	Average	33	77.6	19.2	0.0	3.1	84.6	79.5	0.0	5.8	82.0	445
Red Poll	Hereford	10	69.3	30.7	0.0	0.1	90.9	81.8	10.2	0.2	83.5	479
	Angus	16	100.0	0.0	0.0	0.0	89.5	79.0	12.5	0.0	79.1	449
	Average	26	84.6	15.3	0.0	0.0	90.0	80.0	11.3	0.1	81.3	464
Brown Swiss	Hereford	24	84.1	15.8	0.0	0.1	88.9	81.5	7.7	0.1	89.4	496
	Angus	25	94.4	2.0	0.0	3.6	100.0	91.7	12.4	0.3	79.2	482
	Average	49	89.2	8.9	0.0	1.9	94.1	86.3	10.1	0.2	84.3	489
Gelbvieh	Hereford	20	95.4	4.5	0.0	0.0	100.0	95.0	0.0	4.9	90.3	508
	Angus	22	100.0	0.0	0.0	0.0	100.0	90.9	9.1	0.0	80.8	489
	Average	42	97.7	2.3	0.0	0.0	100.0	92.9	4.4	2.4	85.6	498
Maine Anjou	Hereford	19	89.5	10.5	0.0	0.0	90.5	85.7	0.0	5.1	96.9	486
	Angus	15	89.8	10.0	0.0	0.2	83.3	77.8	3.4	0.0	86.4	477
	Average	34	89.7	10.2	0.0	0.1	87.2	82.1	1.7	1.8	91.7	482
Chianina	Hereford	11	98.6	1.3	0.0	0.1	78.6	71.4	0.5	10.9	95.1	489
	Angus	15	84.3	15.6	0.0	0.1	100.0	87.5	9.8	0.0	92.9	485
	Average	26	91.5	8.4	0.0	0.1	90.0	80.0	5.1	4.3	94.0	487
Average	Hereford	99	84.8	14.0	0.0	1.2	87.5	81.3	3.0	4.7	89.5	485
All Sire	Angus	111	92.0	7.5	0.0	0.5	95.0	86.6	7.8	0.2	83.5	470
Breeds	Average	210	88.4	10.7	0.0	0.9	91.3	84.0	5.4	2.4	86.5	477

^a Calves from these cows were sired by 3/4 Simmental bulls (appendix table 4).

^b No difficulty includes no assistance or minor hand assistance.

^c Of cows alive at calving; heifers removed from experiment only for serious injury, being open two successive years or by death.

^d Early mortality is within 72 hr of birth; late is from 72 hr after birth until weaning.

^e Adjusted to a steer basis. Least-squares adjustment factors for heifers were 6.4 lb. for birth weight and 26 lb. for 200-day weight.

TABLE 10. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DATE, REBREEDING PERFORMANCE AND SIZE OF COWS CALVING AS 3-YEAR-OLDS
CYCLE II, PHASE 2 - COWS BORN IN 1973

Breed of Cow		No. Calving as 3-Year-Olds	Avg. Calving Date	Postpartum Interval, Days ^a	Percent Pregnant ^b	Cow Wt. at 3½ Yrs. of Age, lb.	Hip Ht. at 3½ Yrs. of Age, in.
Sire	Dam						
Angus Hereford	Hereford	15	March 30	67.7	93.3	988	47.8
	Angus	18	April 1	66.5	100.0	935	47.3
	Average	33	March 31	67.0	97.1	962	47.5
Red Poll	Hereford	10	March 31	60.1	100.0	895	47.1
	Angus	16	March 31	75.8	81.3	898	47.8
	Average	26	March 31	69.7	88.5	896	47.5
Brown Swiss	Hereford	24	April 5	68.6	95.8	965	50.0
	Angus	25	March 27	71.5	100.00	943	49.2
	Average	49	March 31	70.1	97.9	954	49.6
Gelbvieh	Hereford	20	April 7	63.6	95.0	979	50.0
	Angus	22	April 1	63.4	95.5	976	49.1
	Average	42	April 4	63.5	95.2	977	49.5
Maine Anjou	Hereford	19	April 3	65.4	89.5	1053	50.7
	Angus	15	March 31	62.6	93.3	1071	49.3
	Average	34	April 1	64.1	91.2	1062	50.0
Chianina	Hereford	11	April 9	65.2	100.0	1119	54.4
	Angus	15	April 7	63.2	100.0	1078	53.1
	Average	26	April 8	64.0	100.0	1099	53.8
Average All Sire Breeds	Hereford	99	April 4	65.7	95.0	1000	50.0
	Angus	111	April 1	67.0	95.5	983	49.3
	Average	210	April 2	66.4	95.3	992	49.6

^a

Interval from calving to first estrus.

^b

Breeding period was 63 days by natural service to 3/4 Simmental bulls (appendix table 4). Percent pregnant = no. palpated as pregnant ÷ no. palpated, and only include cows that calved prior to breeding.

TABLE 11. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY, CALF CROP PERCENTAGE, CALF MORTALITY, BIRTH WEIGHT AND WEANING WEIGHT OF CALVES FROM 2-YEAR-OLD COWS^a
CYCLE II, PHASE 2 - COWS BORN IN 1973, 1974

Breed of Cow		No. Calves Born	Type of Parturition, % ^b				Calf Crop, % ^c		Calf Mortality, % ^d		Calf Wt., lb. ^e	
Sire	Dam		No Diff.	Calf- Puller	C- Section	Abn. Pre- sentation	Born	Weaned	Early	Late	Birth	200- Day
Hereford	Hereford	33	17.0	67.8	8.5	6.8	86.8	65.8	29.6	0.0	75.7	395
	Angus	31	53.1	41.6	2.2	3.0	75.5	59.2	20.9	1.5	76.3	403
	Red Poll	17	9.1	67.2	16.0	7.8	81.0	66.7	14.6	0.0	84.5	385
	Brown Swiss	11	21.6	50.8	10.9	16.6	91.7	91.7	3.1	0.0	85.9	470
	Average	92	25.2	56.8	9.4	8.6	81.7	65.8	17.0	0.0	80.6	413
Angus	Hereford	30	44.8	55.2	0.4	0.0	89.7	79.5	6.4	0.0	76.9	401
	Angus	46	40.4	47.6	3.2	8.8	83.6	80.0	0.0	8.6	71.6	396
	Red Poll	18	53.9	25.2	6.5	14.4	85.7	81.0	0.5	7.7	78.5	406
	Brown Swiss	12	85.3	7.1	6.6	1.0	85.7	71.4	9.4	8.2	83.5	461
	Average	106	56.1	33.8	4.2	6.0	86.1	79.1	3.0	5.5	77.6	416
Red Poll	Hereford	36	21.4	65.2	8.5	4.8	86.1	69.8	18.9	1.9	84.0	430
	Angus	43	35.4	48.6	10.2	5.8	81.1	62.3	9.9	10.9	77.9	418
	Red Poll	20	38.1	47.6	0.0	14.3	71.4	46.4	35.8	9.4	82.1	429
	Brown Swiss	6	83.3	16.7	0.0	0.0	75.0	62.5	11.3	7.1	93.0	465
	Average	105	44.6	44.5	4.6	6.2	80.3	61.4	19.0	7.3	84.2	436
Brown Swiss	Hereford	61	55.7	39.4	2.2	2.7	95.4	73.9	15.0	7.7	82.5	459
	Angus	55	66.0	27.7	3.8	2.5	88.9	77.8	9.2	0.2	80.1	464
	Red Poll	14	33.5	51.2	0.1	15.2	82.4	76.5	11.5	4.7	91.0	481
	Brown Swiss	25	56.0	32.0	8.0	4.0	92.6	77.8	0.0	20.6	89.6	493
	Average	155	52.8	37.6	3.5	6.1	91.3	76.2	7.6	8.3	85.8	474
Average All Sire Breeds	Hereford	160	34.7	56.9	4.9	3.5	90.3	72.4	17.5	1.4	79.8	421
	Angus	175	48.7	41.4	4.9	5.1	82.7	70.5	8.9	5.3	76.5	420
	Red Poll	69	33.7	47.8	5.7	12.9	79.3	65.5	15.6	4.7	84.0	426
	Brown Swiss	54	61.6	26.7	6.4	5.4	88.5	77.1	4.6	8.4	88.0	472
	Average	458	44.7	43.2	5.5	6.7	85.4	71.1	11.6	5.0	82.1	435

^a Calves from these cows were sired by Hereford, Angus, Brangus and Santa Gertrudis bulls (appendix table 4).

^b No difficulty includes no assistance or minor hand assistance.

^c Of cows alive at calving; heifers removed from experiment only for serious injury or by death and not for being open.

^d Early mortality is within 72 hr of birth; late is from 72 hr after birth until weaning.

^e Adjusted to a steer basis. Least-squares adjustment factors for heifers were 8.0 lb. for birth weight and 28 lb. for 200-day weight.

TABLE 12. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DATE, REBREEDING PERFORMANCE AND SIZE OF COWS CALVING AS 2-YEAR-OLDS
CYCLE II, PHASE 2 - COWS BORN IN 1973-74

Breed of Cow		No. Calving as 2-Year-Olds	Avg. Calving Date	Postpartum Interval, Days ^a	Percent Pregnant ^b	Cow Wt. at 2½ Yrs. of Age, lb.	Hip Ht. at 2½ Yrs. of Age, in.
Sire	Dam						
Hereford	Hereford	33	March 23	68.3	90.9	889	46.8
	Angus	31	March 22	65.4	94.7	917	46.6
	Red Poll	17	March 24	66.4	94.1	966	48.0
	Brown Swiss	11	March 28	66.6	100.0	1016	50.2
	Average	92	March 24	66.6	93.9	947	47.9
Angus	Hereford	30	March 25	72.3	85.7	939	47.1
	Angus	46	March 24	73.4	95.7	890	46.1
	Red Poll	18	March 21	64.3	100.0	937	47.8
	Brown Swiss	12	March 21	61.7	91.7	1034	50.4
	Average	106	March 23	70.2	92.8	950	47.8
Red Poll	Hereford	36	March 27	68.4	83.8	879	47.6
	Angus	43	March 24	67.5	90.7	874	47.1
	Red Poll	20	March 16	75.3	90.0	925	48.8
	Brown Swiss	6	March 9	68.2	83.3	966	51.4
	Average	105	March 19	69.2	87.7	911	48.7
Brown Swiss	Hereford	61	March 27	73.0	90.3	933	49.2
	Angus	55	March 23	71.2	96.4	939	49.0
	Red Poll	14	March 13	77.0	92.9	937	50.0
	Brown Swiss	25	March 10	82.3	84.0	962	51.9
	Average	155	March 18	74.3	91.7	943	50.1
Average all Sire Breeds	Hereford	160	March 25	70.9	88.0	910	47.7
	Angus	175	March 23	69.7	94.5	905	47.2
	Red Poll	69	March 18	70.6	94.2	941	48.7
	Brown Swiss	54	March 17	72.8	88.9	994	51.0
	Average	458	March 21	70.6	91.5	938	48.6

^a Interval from calving to first estrus.

^b Breeding period was 63 days by natural service to 3/4 Simmental bulls. (Appendix table 4). Percent pregnant = no. palpated as pregnant ÷ no. palpated, and only include cows that calved prior to breeding.

TABLE 13. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY, CALF CROP PERCENTAGE, CALF MORTALITY, BIRTH WEIGHT AND WEANING WEIGHT OF CALVES FROM 3-YEAR-OLD COWS^a
CYCLE II, PHASE 2 - COWS BORN IN 1973

Breed of Cow		No. Calves Born	Type of Parturition, %				Calf Crop, % ^c		Calf Mortality, % ^d		Calf Wt., lb. ^e	
Sire	Dam		No. Diff. ^b	Calf- Puller	C- Section	Abn. Pre- sentation	Born	Weaned	Early	Late	Birth	200- Day
Hereford	Hereford	18	77.8	16.7	0.0	5.6	94.7	73.7	16.7	5.6	84.5	428
	Angus	18	80.8	19.3	0.3	0.0	95.0	90.0	0.0	5.6	82.9	436
	Red Poll	9	90.3	9.4	1.0	0.0	90.9	90.9	0.0	0.0	87.3	425
	Brown Swiss	6	80.3	4.2	15.3	0.2	100.0	100.0	2.0	0.0	99.2	529
	Average	51	82.3	12.4	4.1	1.2	94.7	86.0	2.7	2.4	88.5	455
Angus	Hereford	15	72.6	20.5	0.0	6.9	73.7	68.4	0.0	6.8	82.1	455
	Angus	26	92.7	7.4	0.0	0.0	92.9	89.3	3.6	0.0	82.6	435
	Red Poll	11	100.0	0.0	0.0	0.0	100.0	83.3	8.1	7.8	79.3	434
	Brown Swiss	9	100.0	0.0	0.8	0.0	100.0	100.0	0.0	0.0	87.3	493
	Average	61	92.0	6.2	0.2	1.6	89.7	83.8	2.8	3.4	82.8	454
Red Poll	Hereford	10	67.2	32.4	0.0	0.4	90.9	81.8	10.7	0.0	83.9	479
	Angus	16	100.0	0.0	0.0	0.0	89.5	79.0	12.5	0.0	79.6	449
	Red Poll	11	75.7	24.0	0.0	0.3	92.3	84.6	7.5	0.0	91.2	489
	Brown Swiss	4	96.1	8.2	0.0	0.0	75.0	50.0	4.1	23.6	90.9	468
	Average	41	84.7	16.2	0.0	0.0	89.4	78.7	8.7	5.8	86.4	471
Brown Swiss	Hereford	24	83.5	16.3	0.0	0.2	88.9	81.5	7.9	0.0	89.9	497
	Angus	25	93.4	2.9	0.0	3.9	100.0	91.7	12.8	0.0	79.7	483
	Red Poll	7	89.1	10.8	0.3	0.0	100.0	85.7	12.5	1.4	91.4	521
	Brown Swiss	11	100.0	0.0	0.0	0.0	84.6	84.6	0.0	0.0	85.2	519
	Average	67	91.7	7.3	0.0	1.0	93.0	85.9	8.2	0.3	86.6	505
Average	Hereford	67	75.2	21.5	0.0	3.3	86.8	76.3	8.8	3.0	85.1	465
All Sire	Angus	85	91.7	7.4	0.0	0.9	94.5	87.9	6.8	1.3	81.2	451
Breeds	Red Poll	38	89.3	10.6	0.3	0.0	95.4	86.1	5.5	1.9	87.3	467
	Brown Swiss	30	94.5	2.6	3.3	0.0	90.9	87.9	1.3	5.6	90.7	502
	Average	220	87.7	10.5	0.9	0.9	91.8	84.0	5.6	3.0	86.1	471

^a Calves from these cows were sired by 3/4 Simmental bulls (see appendix table 4).

^b No assistance or minor hand assistance.

^c Of cows alive at calving; cows removed from experiment only for serious injury, being open two successive years or by death.

^d Early mortality is within 72 hr of birth; late is from 72 hr after birth until weaning.

^e Adjusted to a steer basis. Least-squares adjustment factors for heifers were 6.4 for birth weight and 16.3 lb. for 200-day weight.

TABLE 14. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DATE, REBREEDING PERFORMANCE AND SIZE OF COWS CALVING AS 3-YEAR-OLDS
CYCLE II, PHASE 2 - COWS BORN IN 1973

Breed of Cow		No. Calving as 3-Year-Olds	Avg. Calving Date	Postpartum Interval, Days ^a	Percent Pregnant ^b	Cow Wt. at 3½ Yrs. of Age, lb.	Hip Ht. at 3½ Yrs. of Age, in.
Sire	Dam						
Hereford	Hereford	18	April 5	61.1	94.4	928	47.0
	Angus	18	April 2	66.5	100.0	935	47.3
	Red Poll	9	April 11	60.4	90.0	949	48.5
	Brown Swiss	6	April 9	62.6	100.0	988	51.1
	Average	51	April 7	63.0	96.3	950	48.5
Angus	Hereford	15	March 30	67.7	93.3	988	47.8
	Angus	26	March 26	75.4	96.2	931	46.8
	Red Poll	11	March 29	73.6	83.3	987	48.2
	Brown Swiss	9	March 30	67.0	77.8	1012	51.0
	Average	61	March 29	72.0	90.3	979	48.5
Red Poll	Hereford	10	April 1	60.1	100.0	895	47.1
	Angus	16	March 31	75.8	81.3	898	47.8
	Red Poll	11	March 31	75.2	91.7	918	49.2
	Brown Swiss	4	April 10	60.7	100.0	1056	51.8
	Average	41	April 3	70.8	90.2	942	49.0
Brown Swiss	Hereford	24	April 5	68.6	95.8	965	50.0
	Angus	25	March 28	71.5	100.0	943	49.2
	Red Poll	7	March 30	69.7	100.0	989	51.3
	Brown Swiss	11	April 4	84.7	90.9	970	52.7
	Average	67	April 1	72.3	97.0	967	50.8
Average	Hereford	67	April 3	65.3	95.5	944	48.0
All Sire	Angus	85	March 30	72.5	95.3	927	47.8
Breeds	Red Poll	38	April 2	71.5	90.2	961	49.3
	Brown Swiss	30	April 6	71.1	90.0	1007	51.7
	Average	220	April 2	69.9	93.7	959	49.2

^a Interval from calving to first estrus.

^b Breeding period was 63 days by natural service to 3/4 Simmental bulls (appendix table 4). Percent pregnant = no. palpated as pregnant ÷ no. palpated, and only include cows that calved prior to breeding.

TABLE 15. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY AND CALF MORTALITY OF CALVES FROM 2-YEAR-OLD COWS
CYCLE II, PHASE 3 - 1975-76 CALF CROPS

Breed of Calf		No. Calves Born	Type of Parturition, %				Calf Mortality ^c	
Sire	Dam ^a		No Diff. ^b	Calf- Puller	C- Section	Abn. Pre- sentation	Early	Late
Angus	Hereford-Crosses	48	57.4	37.2	3.1	2.3	4.7	1.5
Hereford	Angus-Crosses	65	45.5	41.1	5.3	8.2	15.7	1.2
AI Sires	Average	113	51.5	39.2	4.2	5.2	10.2	1.3
Brangus	Hereford-Crosses	73	39.7	52.5	4.3	3.5	7.1	4.0
	Angus-Crosses	77	46.9	47.8	5.6	0.0	10.9	11.3
	Average	150	43.3	50.2	4.9	1.6	9.0	7.6
Santa Gertrudis	Hereford-Crosses	71	36.4	55.0	6.3	2.4	22.4	6.4
	Angus-Crosses	72	33.9	53.7	11.7	0.8	11.3	2.2
	Average	143	35.1	54.3	9.0	1.6	16.9	4.3
Angus	Hereford-Crosses	40	49.2	40.8	3.4	6.6	7.9	7.3
Hereford	Angus-Crosses	36	63.8	27.2	3.7	5.2	11.9	2.4
Clean Up Sires	Average	76	56.5	34.0	3.6	5.9	9.9	4.9
Average	Hereford-Crosses	232	45.7	46.4	4.3	3.7	10.5	4.8
All Sire	Angus-Crosses	250	47.5	42.4	6.6	3.5	12.4	4.3
Breeds	Average	482	46.6	44.4	5.4	3.6	11.5	4.5

^a Two-way-cross cows mated as shown in appendix table 4.

^b No assistance or minor hand assistance.

^c Early mortality is within 72 hr of birth; late is from 72 hr after birth until weaning.

TABLE 16. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
BIRTH DATE, BIRTH WEIGHT AND PREWEANING GROWTH OF CALVES FROM 2-YEAR-OLD COWS
CYCLE II, PHASE 3 - 1975-76 CALF CROPS

Breed of Calf		No. Calves ^b Weaned	Birth Date	Calf Wt., lb. ^c		Prewn. ADG, lb. ^c	200-Day ^d Wt. Ratio
Sire	Dam ^a			Birth	200- Day		
Angus	Hereford-Crosses	43	March 18	76.6	436	1.81	100.0
Hereford	Angus-Crosses	54	March 16	80.2	437	1.80	100.2
AI Sires	Average	97	March 17	78.4	436	1.80	100.0
Brangus	Hereford-Crosses	62	March 19	83.2	446	1.82	102.3
	Angus-Crosses	57	March 18	80.5	437	1.79	100.2
	Average	119	March 18	81.8	442	1.80	101.4
Santa Gertrudis	Hereford-Crosses	48	March 22	87.1	440	1.78	100.9
	Angus-Crosses	61	March 18	86.2	450	1.83	103.2
	Average	109	March 20	86.7	445	1.80	102.1
Angus	Hereford-Crosses	34	April 21	80.7	429	1.74	98.4
Hereford	Angus-Crosses	33	April 19	82.3	435	1.77	99.8
Clean Up Sires	Average	67	April 20	81.5	432	1.76	99.1
Average	Hereford-Crosses	187	March 28	81.9	438	1.79	100.5
All Sire	Angus-Crosses	205	March 25	82.3	440	1.79	100.9
Breeds	Average	392	March 26	82.1	439	1.79	100.7

^a Two-way-cross cows mated as shown in appendix table 4.

^b Birth traits calculated from all calves born. Weaning traits calculated from all calves weaned and raised by their own dam.

^c Adjusted to a steer basis. Least-squares adjustment factors for heifers were 8.1 lb. for birth weight, 28 lb. for 200-day weight and .11 lb./day for ADG.

^d Ratio computed relative to 436 lb. average for Hereford and Angus AI sired calves.

TABLE 17. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY AND CALF MORTALITY OF CALVES FROM 4-5-6-7-8-9-10-11-YEAR OLD COWS
CYCLE III, PHASE 2 - 1975, 1976 CALF-CROPS

Breed of Calf		No. Calves Born	Type of Parturition, %				Calf Mortality, % ^b	
Sire	Dam		No Calving Difficulty ^a	Calf- Puller	C-Section	Abnormal Presentation	Early	Late
Angus Hereford	Hereford	136	94.5	5.1	0.0	0.7	3.0	0.7
	Angus	220	90.8	4.8	0.0	4.7	3.7	1.0
	Average	356	92.7	5.0	0.0	2.7	3.3	0.9
Brahman	Hereford	139	82.5	12.7	0.4	4.5	7.5	2.6
	Angus	210	86.3	11.4	0.0	2.6	3.4	1.3
	Average	349	84.4	12.0	0.0	3.6	5.5	2.0
Sahiwal	Hereford	126	85.3	10.9	0.4	3.3	4.3	1.3
	Angus	199	89.4	7.0	0.8	2.8	6.1	1.9
	Average	325	87.4	9.0	0.6	3.0	5.2	1.6
Pinzgauer	Hereford	148	87.2	7.7	0.2	4.8	4.2	1.4
	Angus	228	85.8	8.2	0.0	6.0	5.0	1.9
	Average	376	86.5	7.9	0.1	5.4	4.6	1.7
Tarentaise	Hereford	69	88.0	8.8	0.0	3.5	5.8	1.9
	Angus	133	92.1	6.5	0.0	1.6	4.2	1.0
	Average	202	90.0	7.7	0.0	2.5	5.0	1.5
Average All Sire Breeds	Hereford	618	87.5	9.1	0.1	3.3	5.0	1.6
	Angus	990	88.9	7.6	0.0	3.5	4.5	1.5
	Average	1608	88.2	8.3	0.0	3.4	4.7	1.5

^a No assistance or minor hand assistance.

^b Early mortality is within 72 hr. of birth; late is from 72 hr. after birth until weaning.

TABLE 18. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
BIRTH DATE, BIRTH WEIGHT AND PREWEANING GROWTH^a
CYCLE III, PHASE 2 - 1975, 1976 CALF CROPS

Breed of Calf		No. Calves ^b Weaned	Birth Date ^c	Birth Wt., lb. ^d	Adj. 200-Day Wt., lb. ^d	Prewn. ADG, lb. ^d	200-Day Wt. ^e Ratio
Sire	Dam						
Angus	Hereford	132	April 4	80.0	448	1.83	96.3
Hereford	Angus	211	April 2	77.6	482	2.01	103.7
	Average	343	April 3	78.8	465	1.92	100.0
Brahman	Hereford	125	April 15	95.0	470	1.87	101.1
	Angus	199	April 7	88.8	517	2.13	111.2
	Average	324	April 11	91.9	494	2.00	106.2
Sahiwal	Hereford	122	April 18	89.8	447	1.77	96.1
	Angus	185	April 12	82.7	482	1.99	103.7
	Average	307	April 15	86.3	465	1.88	100.0
Pinzgauer	Hereford	140	April 7	89.4	451	1.80	97.0
	Angus	213	April 1	83.0	500	2.07	107.5
	Average	353	April 4	86.2	475	1.93	102.2
Tarentaise	Hereford	64	April 8	86.8	461	1.85	99.1
	Angus	127	April 4	80.5	496	2.06	106.7
	Average	191	April 6	83.6	478	1.96	102.8
Average	Hereford	583	April 10	88.2	455	1.82	97.8
All Sire	Angus	935	April 5	82.5	495	2.05	106.5
Breeds	Average	1518	April 8	85.4	475	1.94	102.2

- ^a All calves from cows 4 years of age or older.
^b Birth traits calculated from all calves born, weaning traits calculated on all calves weaned and raised by their own dam.
^c The AI breeding season to produce the 1975 calves was initiated on June 3, 1974 except for Sahiwal sires for which semen was not available until June 12, 1974. In 1975, breeding began at the same time for all sire breeds.
^d Adjusted to a steer basis. Least-squares adjustment factors for heifers were 9.13 lb. for birth weight, 35 lb. for 200-day weight, and .13 lb/day for ADG.
^e Ratio computed relative to average 465 lb. for Angus-Hereford and Hereford-Angus crossbred controls.

TABLE 19. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
STEER POSTWEANING FEEDLOT RATIONS
CYCLE III, PHASE 2 - 1975 CALF CROP

Period	Ingredients				Ration Analyses, 100% D.B. Basis ^a			
	Corn Silage, %	Corn, %	Soybean Oil Meal, %	Supple- ^b ment, %	C.P., %	D.P., %	TDN, %	Mcal. M.E./lb.
Dec. 1 - Dec. 2	60.0	36.0	2.0	2.0	11.91	8.76	82.55	1.35
Dec. 3 - Dec. 22	80.0	14.0	3.0	3.0	13.45	9.81	76.52	1.25
Dec. 23 - Jan. 19	75.0	19.0	3.0	3.0	13.32	9.78	78.08	1.28
Jan. 20 - Feb. 16	70.0	24.0	3.0	3.0	13.21	9.75	79.48	1.30
Feb. 17 - Slaughter	65.0	30.5	1.5	3.0	13.03	9.67	80.98	1.33

^a

Estimated composition based on proximate analysis.

^b

Crude protein level (100% D.M. basis) in the supplement was 50.1% for the ration used Dec. 1 and 2 and 46.3% for the rations used from December 3 through slaughter.

TABLE 20. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
POSTWEANING ADG, FINAL WEIGHT AND FEED EFFICIENCY (FEED/GAIN)
CYCLE III, PHASE 2 - 1975 CALF CROP

Breed of Steer		No. Steers ^a				Postweaning Average Daily Gain ^b				Final Weight					Feed Efficiency ^d (TDN and Mcal ME)			
Sire	Dam	192	218	246	Total	192	218	246	Avg.	192	218	246	Avg.	Ratio ^c	192	218	246	Avg.
Angus	Hereford	18	18	19	55	2.54	2.50	2.41	2.48	1037	1099	1145	1094	99.5				
Hereford	Angus	20	19	19	58	2.45	2.45	2.33	2.41	1050	1117	1150	1106	100.6	5.72	5.99	6.24	5.98
	Average	38	37	38	113	2.49	2.47	2.37	2.45	1044	1108	1148	1100	100.0	(9.38)	(9.82)	(10.23)	(9.81)
Brahman	Hereford	11	11	12	34	2.50	2.38	2.41	2.43	1027	1069	1140	1078	98.0				
	Angus	21	21	21	63	2.38	2.34	2.40	2.37	1060	1124	1179	1121	101.9	6.03	6.20	6.29	6.17
	Average	32	32	33	97	2.44	2.36	2.40	2.40	1043	1096	1159	1100	100.0	(9.89)	(10.17)	(10.32)	(10.12)
Sahiwal	Hereford	12	12	13	37	2.34	2.30	2.22	2.29	962	1017	1074	1018	92.6				
	Angus	16	16	15	47	2.13	2.08	2.10	2.10	959	1011	1070	1013	92.1	6.14	6.39	6.50	6.34
	Average	28	28	28	84	2.24	2.19	2.16	2.19	960	1014	1072	1015	92.3	(10.07)	(10.48)	(10.66)	(10.40)
Pinzgauer	Hereford	14	15	15	44	2.72	2.61	2.55	2.63	1072	1129	1169	1123	102.1				
	Angus	25	24	23	72	2.48	2.47	2.34	2.43	1080	1139	1171	1130	102.7	5.67	5.92	6.21	5.93
	Average	39	39	38	116	2.60	2.54	2.44	2.53	1076	1134	1170	1127	102.5	(9.30)	(9.71)	(10.18)	(9.73)
Tarentaise	Hereford	4	3	3	10	2.55	2.47	2.38	2.47	1025	1057	1138	1073	97.6				
	Angus	10	11	11	32	2.37	2.24	2.21	2.27	1034	1067	1120	1074	97.6	5.88	6.20	6.30	6.13
	Average	14	14	14	42	2.46	2.36	2.29	2.37	1030	1062	1129	1074	97.6	(9.64)	(10.17)	(10.33)	(10.05)
Average	Hereford	59	59	62	180	2.53	2.45	2.39	2.46	1025	1074	1133	1077	97.9				
All Sire	Angus	92	91	89	272	2.36	2.32	2.27	2.32	1037	1091	1138	1089	99.0	5.89	6.14	6.31	6.11
Breeds	Average	151	150	151	452	2.44	2.38	2.33	2.39	1031	1083	1136	1083	98.5	(9.66)	(10.07)	(10.35)	(10.02)

^a Number of steers slaughtered after 192, 218 and 246 days on feed after a 40-day postweaning adjustment period.

^b ADG = (actual final weight - actual weaning weight) ÷ days on feed.

^c Ratio relative to 1100 lb. average of Hereford-Angus crossbreds.

^d Metabolizable Energy (ME) values shown in parentheses. TDN Efficiency = lb. TDN consumed per lb. gain. Mcal ME = lb. TDN x 1.64. TDN and ME on a 100% dry matter basis.

TABLE 21. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
HOT CARCASS WEIGHT, DRESSING PERCENTAGE, U.S.D.A. QUALITY GRADE AND MARBLING SCORE
CYCLE III, PHASE 2 - 1975 CALF CROP

Breed of Steer		Hot Carcass Wt., lb.				Dressing Percentage ^a				U.S.D.A. Quality Grade ^b				Marbling Score ^c			
Sire	Dam	192	218	246	Avg.	192	218	246	Avg.	192	218	246	Avg.	192	218	246	Avg.
Angus Hereford	Hereford	620	667	708	665	60.1	61.3	62.1	61.1	12.0	12.6	13.3	12.6	11.1	12.8	15.5	13.1
	Angus	637	683	722	681	61.0	61.7	63.0	61.9	11.8	12.5	12.5	12.3	10.6	12.9	12.8	12.1
	Average	629	675	715	673	60.5	61.5	62.5	61.5	11.9	12.5	12.9	12.4	10.8	12.9	14.2	12.6
Brahman	Hereford	615	657	702	658	60.2	62.0	61.8	61.3	11.2	10.2	11.8	11.0	10.3	8.3	11.0	9.8
	Angus	644	700	733	692	61.1	62.9	62.4	62.1	11.0	11.7	12.1	11.6	9.3	10.9	11.7	10.6
	Average	630	678	717	675	60.6	62.5	62.1	61.7	11.1	10.9	11.9	11.3	9.8	9.6	11.3	10.2
Sahiwal	Hereford	574	618	654	615	60.1	61.3	61.2	60.8	10.3	10.8	11.5	10.8	8.4	9.1	9.9	9.1
	Angus	584	624	655	621	61.1	62.2	61.4	61.6	10.8	12.5	12.5	11.9	9.3	12.4	12.6	11.4
	Average	579	621	654	618	60.6	61.8	61.3	61.2	10.5	11.6	12.0	11.4	8.9	10.8	11.3	10.3
Pinzgauer	Hereford	615	674	700	663	57.7	60.2	60.3	59.4	11.3	12.1	11.6	11.7	9.7	12.5	10.8	11.0
	Angus	642	682	718	681	59.7	60.4	61.6	60.6	12.4	12.6	13.2	12.7	12.0	13.1	14.5	13.2
	Average	629	678	709	672	58.7	60.3	60.9	60.0	11.8	12.4	12.4	12.2	10.9	12.8	12.6	12.1
Tarentaise	Hereford	616	650	692	653	60.4	62.3	61.1	61.3	10.3	12.0	12.3	11.5	8.5	10.3	12.7	10.5
	Angus	633	662	689	661	61.5	62.5	61.8	61.9	10.6	11.5	12.4	11.5	9.2	10.3	12.7	10.7
	Average	625	656	691	657	60.9	62.4	61.4	61.6	10.4	11.8	12.3	11.5	8.9	10.3	12.7	10.6
Average All Sire Breeds	Hereford	608	653	691	651	59.7	61.4	61.3	60.8	11.0	11.5	12.1	11.5	9.6	10.6	12.0	10.7
	Angus	628	670	703	667	60.9	61.9	62.0	61.6	11.3	12.2	12.5	12.0	10.1	11.9	12.9	11.6
	Average	618	662	697	659	60.3	61.7	61.7	61.2	11.1	11.8	12.3	11.8	9.8	11.3	12.4	11.2

^a Dressing percentage equals hot carcass weight divided by final weight on feed and water (without shrink).

^b U.S.D.A. Quality Grade as revised in 1976. 10 = average good, 11 = high good, 12 = low choice, 13 = average choice, etc.

^c Marbling Score: 9 = slight+, 10 = small-, 21 = slightly abundant+.

TABLE 22. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
U.S.D.A. YIELD GRADE, RIBEYE AREA, FAT THICKNESS AND PERCENTAGE KIDNEY, PELVIC AND HEART FAT
CYCLE III, PHASE 2 - 1975 CALF CROP

Breed of Steer		U.S.D.A. Yield Grade				Ribeye Area, sq. in.				Fat Thickness, in.				Est. Kidney, Pelvic and Heart Fat, %			
Sire	Dam	192	218	246	Avg.	192	218	246	Avg.	192	218	246	Avg.	192	218	246	Avg.
Angus Hereford	Hereford	3.7	4.0	4.3	4.0	10.6	10.5	10.8	10.6	.61	.68	.76	.68	3.4	3.6	3.6	3.5
	Angus	4.0	4.4	4.7	4.4	10.1	10.2	10.6	10.3	.71	.78	.85	.78	2.9	3.5	3.8	3.4
	Average	3.9	4.2	4.5	4.2	10.4	10.3	10.7	10.5	.66	.73	.81	.73	3.1	3.5	3.7	3.5
Brahman	Hereford	3.4	3.4	3.8	3.5	10.1	11.1	10.8	10.7	.47	.50	.58	.52	3.2	3.5	3.6	3.4
	Angus	3.6	4.1	4.1	3.9	10.8	11.3	11.3	11.1	.54	.68	.65	.62	3.4	3.9	4.2	3.8
	Average	3.5	3.7	3.9	3.7	10.5	11.2	11.1	10.9	.51	.59	.61	.57	3.3	3.7	3.9	3.6
Sahiwal	Hereford	3.2	3.4	3.6	3.4	10.1	10.4	10.9	10.5	.45	.51	.56	.51	2.6	2.9	3.7	3.1
	Angus	3.6	3.7	3.8	3.7	10.4	10.7	11.2	10.7	.58	.65	.66	.63	3.8	3.2	3.7	3.6
	Average	3.4	3.6	3.7	3.6	10.2	10.5	11.0	10.6	.51	.58	.61	.57	3.2	3.0	3.7	3.3
Pinzgauer	Hereford	2.9	3.4	3.5	3.2	11.0	11.3	11.5	11.3	.35	.49	.52	.45	3.5	3.4	3.8	3.6
	Angus	3.5	3.6	4.0	3.7	10.8	11.6	11.6	11.3	.51	.56	.66	.58	3.6	4.1	4.3	4.0
	Average	3.2	3.5	3.7	3.5	10.9	11.4	11.6	11.3	.43	.52	.59	.52	3.6	3.8	4.1	3.8
Tarentaise	Hereford	3.3	3.4	3.6	3.4	10.0	11.0	11.5	10.8	.38	.40	.53	.44	3.5	4.2	4.0	3.9
	Angus	3.4	3.8	3.6	3.6	10.8	10.6	11.4	10.9	.46	.55	.51	.50	3.8	4.5	4.5	4.3
	Average	3.3	3.6	3.6	3.5	10.4	10.8	11.4	10.9	.42	.47	.52	.47	3.6	4.3	4.2	4.0
Average All Sire Breeds	Hereford	3.3	3.5	3.8	3.5	10.4	10.8	11.1	10.8	.45	.52	.59	.52	3.2	3.5	3.7	3.5
	Angus	3.6	3.9	4.0	3.9	10.6	10.9	11.2	10.9	.56	.64	.67	.62	3.5	3.8	4.1	3.8
	Average	3.5	3.7	3.9	3.7	10.5	10.9	11.1	10.8	.50	.58	.63	.57	3.4	3.7	3.9	3.7

TABLE 23. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
ACTUAL CUTABILITY PERCENTAGE, RETAIL PRODUCT PERCENTAGE, FAT TRIM PERCENTAGE AND BONE PERCENTAGE^a
CYCLE III, PHASE 2 - 1975 CALF CROP

Breed of Steer		Actual Cutability, % ^b				Retail Product, % ^c				Fat Trim, %				Bone, %			
Sire	Dam	192	218	246	Avg.	192	218	246	Avg.	192	218	246	Avg.	192	218	246	Avg.
Angus Hereford	Hereford	54.4	51.5	49.5	51.8	67.9	64.8	61.6	64.8	20.1	23.7	27.4	23.7	12.0	11.6	11.0	11.5
	Angus	53.9	50.3	48.6	50.9	66.9	62.6	60.4	63.3	21.3	26.0	28.9	25.4	11.8	11.3	10.7	11.3
	Average	54.1	50.9	49.0	51.3	67.4	63.7	61.0	64.0	20.7	24.8	28.1	24.6	11.9	11.5	10.9	11.4
Brahman	Hereford	56.6	55.6	53.1	55.1	69.9	68.4	65.1	67.8	16.7	19.1	22.7	19.5	13.4	12.5	12.3	12.7
	Angus	56.2	53.8	52.5	54.2	69.4	66.6	64.4	66.8	18.3	21.9	24.0	21.4	12.4	11.5	11.6	11.8
	Average	56.4	54.7	52.8	54.7	69.6	67.5	64.7	67.3	17.5	20.5	23.3	20.5	12.9	12.0	11.9	12.3
Sahiwal	Hereford	58.0	55.7	53.5	55.7	71.1	68.3	65.5	68.3	15.6	18.9	22.5	19.0	13.2	12.8	12.1	12.7
	Angus	55.5	54.5	52.1	54.0	68.2	67.3	64.3	66.6	19.8	21.1	24.2	21.7	12.0	11.6	11.4	11.7
	Average	56.7	55.1	52.8	54.9	69.7	67.8	64.9	67.5	17.7	20.0	23.3	20.4	12.6	12.2	11.7	12.2
Pinzgauer	Hereford	56.7	54.7	52.5	54.7	70.5	67.6	64.7	67.6	16.0	19.3	22.3	19.2	13.5	13.1	13.0	13.2
	Angus	54.9	54.2	50.9	53.3	68.1	67.0	63.2	66.1	19.1	20.4	25.2	21.6	12.8	12.6	11.7	12.4
	Average	55.8	54.4	51.7	54.0	69.3	67.3	63.9	66.8	17.6	19.9	23.7	20.4	13.1	12.9	12.3	12.8
Tarentaise	Hereford	56.2	55.1	52.9	54.7	69.7	67.6	65.3	67.5	17.6	19.9	22.8	20.1	12.8	12.5	11.9	12.4
	Angus	56.7	53.7	52.8	54.4	70.1	66.3	65.2	67.2	17.8	22.0	23.3	21.0	12.1	11.7	11.5	11.8
	Average	56.4	54.4	52.9	54.6	69.9	67.0	65.3	67.4	17.7	21.0	23.0	20.6	12.4	12.1	11.7	12.1
Average	Hereford	56.4	54.5	52.3	54.4	69.8	67.3	64.4	67.2	17.2	20.2	23.5	20.3	13.0	12.5	12.1	12.5
All Sire	Angus	55.4	53.3	51.4	53.4	68.5	66.0	63.5	66.0	19.3	22.3	25.1	22.2	12.2	11.7	11.4	11.8
Breeds	Average	55.9	53.9	51.8	53.9	69.2	66.6	64.0	66.6	18.2	21.2	24.3	21.3	12.6	12.1	11.7	12.1

^a Detailed carcass cutout data obtained on an average of 24 steers per sire breed by slaughter group subclass for all sire breeds except Tarentaise. Only 14 Tarentaise steers were included in each slaughter group.

^b Actual Cutability, % = Actual yield of boneless, closely trimmed beef from the round, loin, rib and chuck.

^c Retail Product, % = Actual yield of boneless, closely trimmed beef from the carcass.

TABLE 24. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
WARNER-BRATZLER SHEAR AND TASTE PANEL TENDERNESS, FLAVOR, JUICINESS AND ACCEPTABILITY^{a,b}
CYCLE III, PHASE 2 - 1975 CALF CROP

Breed of Steer		W-B Shear, lb.				T.P. Tenderness				T.P. Flavor				T.P. Juiciness				T.P. Acceptability			
Sire	Dam	192	218	246	Avg.	192	218	246	Avg.	192	218	246	Avg.	192	218	246	Avg.	192	218	246	Avg.
Angus	Hereford	7.3	7.6	6.3	7.1	7.6	7.5	7.8	7.6	7.4	7.2	7.2	7.3	7.2	7.2	7.5	7.3	7.5	7.3	7.6	7.5
Hereford	Angus	7.5	8.3	6.4	7.4	7.0	6.8	7.8	7.2	7.1	6.8	7.0	6.9	7.0	7.0	6.9	7.0	6.9	6.8	7.2	7.0
	Average	7.4	8.0	6.3	7.2	7.3	7.1	7.8	7.4	7.2	7.0	7.1	7.1	7.1	7.1	7.2	7.1	7.2	7.1	7.4	7.2
Brahman	Hereford	10.1	8.9	7.5	8.8	5.6	6.6	6.6	6.3	7.0	6.9	7.2	7.1	6.6	6.9	7.0	6.8	6.1	6.9	6.8	6.6
	Angus	10.9	9.1	7.8	9.3	6.0	7.0	7.0	6.7	7.0	7.1	7.0	7.0	7.0	7.0	6.6	6.9	6.3	7.1	6.8	6.7
	Average	10.5	9.0	7.7	9.1	5.8	6.8	6.8	6.5	7.0	7.0	7.1	7.0	6.8	7.0	6.8	6.9	6.2	7.0	6.8	6.6
Sahiwal	Hereford	10.1	11.0	8.4	9.8	6.0	4.9	6.5	5.8	6.6	6.7	7.1	6.8	7.0	6.5	7.0	6.8	6.0	5.2	6.6	6.0
	Angus	10.8	10.3	8.1	9.7	6.0	5.8	6.6	6.1	6.9	6.8	6.9	6.9	6.8	6.8	7.0	6.9	6.2	6.2	6.6	6.3
	Average	10.4	10.7	8.3	9.8	6.0	5.3	6.5	6.0	6.8	6.8	7.0	6.9	6.9	6.7	7.0	6.9	6.1	5.7	6.6	6.1
Pinzgauer	Hereford	8.5	7.9	6.9	7.8	7.3	6.8	7.5	7.2	7.0	7.1	7.3	7.2	7.0	7.2	7.2	7.1	7.1	6.7	7.3	7.0
	Angus	8.7	7.4	6.6	7.6	6.1	7.1	7.7	7.0	6.7	7.1	7.2	7.0	6.7	7.0	7.2	7.0	6.1	7.0	7.3	6.8
	Average	8.6	7.7	6.8	7.7	6.7	6.9	7.6	7.1	6.9	7.1	7.2	7.1	6.8	7.1	7.2	7.1	6.6	6.8	7.3	6.9
Tarentaise	Hereford	8.9	7.4	7.7	8.0	6.1	6.7	7.0	6.6	6.6	7.1	7.5	7.1	6.7	6.9	7.0	6.9	6.2	6.4	7.1	6.6
	Angus	9.2	8.7	7.5	8.5	6.2	6.9	7.1	6.8	7.1	7.1	7.1	7.1	6.8	6.9	7.0	6.9	6.3	6.9	7.1	6.8
	Average	9.1	8.0	7.6	8.2	6.2	6.8	7.1	6.7	6.8	7.1	7.3	7.1	6.8	6.9	7.0	6.9	6.3	6.7	7.1	6.7
Average	Hereford	9.0	8.6	7.4	8.3	6.5	6.5	7.1	6.7	6.9	7.0	7.3	7.1	6.9	6.9	7.2	7.0	6.6	6.5	7.1	6.7
All Sire	Angus	9.4	8.8	7.3	8.5	6.3	6.7	7.2	6.8	7.0	7.0	7.0	7.0	6.9	7.0	7.0	7.0	6.4	6.8	7.0	6.7
Breeds	Average	9.2	8.7	7.3	8.4	6.4	6.6	7.2	6.7	6.9	7.0	7.1	7.0	6.9	6.9	7.1	7.0	6.5	6.6	7.0	6.7

^a Warner-Bratzler shear is a measure of the pounds of force required to shear one-half inch cores of steaks cooked at 350°F to 150°F internal temperature and cooled for 30 minutes at room temperature. Warner-Bratzler shear was measured on the same steers from which detailed carcass cutout data was obtained (table 23).

^b Taste panel scores are based on a 9-point hedonic scale, with higher scores indicating greater acceptability. Taste panel traits were measured on steaks from 6 steers per sire-dam breed group per slaughter date.

TABLE 25. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
POSTWEANING GROWTH, PUBERTY AND CONCEPTION OF HEIFERS
CYCLE III, PHASE 2 - BORN IN 1975

Breed of Heifer		No. Heifers	200-Day Postwn. ADG, lb.	Adj. 400-Day ^a Wt., lb.	Adj. 550-Day ^b Wt., lb.	550-Day ^c Ht., in.	Reaching ^d Puberty, %	Adjusted ^e		Percent ^f Pregnant
Sire	Dam							Puberty Age, days	Puberty Wt., lb.	
Angus Hereford	Hereford	21	1.45	715	813	45.7	95.2	341	657	71.4
	Angus	52	1.37	710	787	45.2	100.0	325	629	90.4
	Average	73	1.41	713	800	45.5	97.6	333	643	80.9
Brahman	Hereford	31	1.37	708	850	49.0	93.5	410	710	87.1
	Angus	41	1.35	746	856	49.0	97.6	389	722	92.7
	Average	72	1.36	727	853	49.0	95.6	400	716	89.9
Sahiwal	Hereford	13	1.29	673	807	48.0	100.0	384	642	84.6
	Angus	19	1.13	655	760	46.4	100.0	364	617	100.0
	Average	32	1.21	664	784	47.2	100.0	374	629	92.3
Pinzgauer	Hereford	33	1.49	727	837	47.7	100.0	327	637	97.0
	Angus	50	1.40	738	815	47.2	98.0	291	615	90.0
	Average	83	1.45	732	826	47.4	99.0	309	626	93.5
Tarentaise	Hereford	17	1.40	710	831	47.4	100.0	333	633	100.0
	Angus	21	1.35	710	789	46.1	100.0	316	620	76.2
	Average	38	1.37	710	810	46.7	100.0	324	626	88.1
Average All Sire Breeds	Hereford	115	1.40	706	828	47.5	97.8	359	656	88.0
	Angus	183	1.32	712	802	46.8	99.1	337	641	89.9
	Average	298	1.36	709	815	47.2	98.4	348	648	89.0

^a Adjusted 400-day wt. = 200-day wt. + (200-day postweaning ADG x 200 days).

^b Adjusted 550-day wt. = 200-day wt. + (350-day postweaning ADG x 350 days).

^c Height at hips.

^d Estrus was determined from weaning to an average of approximately 16 months of age (end of breeding).

^e Adjusted to comparable values if puberty had been detected in 100% of the heifers in all breed groups.

^f The breeding period was 63 days by natural service.

APPENDIX

TABLE 1. MATING PLANS TO PRODUCE CYCLE I, PHASE 2 CALVES

1969, 1970, 1971 Breeding Seasons

Dam Breeds ^a	Sire Breeds						
	Hereford	Angus	Jersey	South Devon	Limousin	Simmental	Charolais
Hereford	X	X	X	X	X	X	X
Angus	X	X	X	X	X	X	X

^a The cows were 1, 2, 3 and 4-year-olds in 1969; 1, 2, 3, 4 and 5-year-olds in 1970; and 2, 3, 4, 5 and 6-year-olds in 1971.

APPENDIX

TABLE 2. MATING PLANS TO PRODUCE CYCLE II, PHASE 2 CALVES

1972 and 1973 Breeding Seasons

Dam Breeds ^a	Sire Breeds						
	Hereford ^b	Angus ^b	Red Poll	Brown Swiss	Gelbvieh	Maine Anjou	Chianina
Hereford ^c	X	X	X	X	X	X	X
Angus ^c	X	X	X	X	X	X	X
Red Poll	X	X	X	X			
Brown Swiss	X	X	X	X			

^a The cows were 3, 4, 5, 6 and 7-year-olds in 1972; and 3, 4, 5, 6, 7 and 8-year-olds in 1973.

^b Sample of same Hereford and Angus sires used in Cycle I, 1969, 1970 and 1971 breeding seasons.

^c Cows used for GPE Cycle I, 1969, 1970 and 1971 breeding seasons.

APPENDIX

TABLE 3. MATING PLANS TO PRODUCE CYCLE I, PHASE 3 CALVES

Breed Group ^a	Sire Breeds										3rd and 4th Calf Crops ^d
	First Calf Crop ^b					Second Calf Crop ^c					
	Here-ford ^e	Angus ^e	Brah-man	Devon	Hol-stein	Here-ford ^e	Angus ^e	Gelb-vieh	Maine Anjou	Chia-nina	
H x H		X					X				X
A x A	X					X					X
A x H			X	X	X			X	X	X	X
H x A			X	X	X			X	X	X	X
J x H		X	X	X	X		X	X	X	X	X
J x A	X		X	X	X	X		X	X	X	X
SD x H		X	X	X	X		X	X	X	X	X
SD x A	X		X	X	X	X		X	X	X	X
L x H		X	X	X	X		X	X	X	X	X
L x A	X		X	X	X	X		X	X	X	X
S x H		X	X	X	X		X	X	X	X	X
S x A	X		X	X	X	X		X	X	X	X
C x H		X	X	X	X		X	X	X	X	X
C x A	X		X	X	X	X		X	X	X	X

^a Females of each breed group distributed equally among cells marked "X" for each calf crop.

^b Each group of heifers bred as yearlings to produce one calf crop as 2-year-olds by these breeds.

^c Each group of cows bred as 2-year-olds to produce one calf crop as 3-year-olds by these breeds.

^d Each group of cows bred to produce at least two calf crops by this breed.

^e Sample of same sires used in Cycle I, 1969-70-71 breeding seasons.

APPENDIX

TABLE 4. MATING PLANS TO PRODUCE CYCLE II, PHASE 3 CALVES

Female Breeding Groups ^a	Sire Breeds				2nd, 3rd and 4th Calf Crops ^c
	First Calf Crop ^b				
	Hereford ^d	Angus ^d	Brangus	Santa Gertrudis	Simmental
Hereford		X	X	X	X
Angus	X		X	X	X
Red Poll	X	X			X
Brown Swiss	X	X			X
H x A & Recip.			X	X	X
H x R.P. & Recip.		X	X	X	X
H x B.S. & Recip.		X	X	X	X
A x R.P. & Recip.	X		X	X	X
A x B.S. & Recip.	X		X	X	X
R.P. x B.S. & Recip.	X	X			X
Gelbvieh x Hereford		X	X	X	X
Gelbvieh x Angus	X		X	X	X
Maine Anjou x Hereford		X	X	X	X
Maine Anjou x Angus	X		X	X	X
Chianina x Hereford		X	X	X	X
Chianina x Angus	X		X	X	X

^a Females of each breed group distributed equally among the cells marked "X" for each calf crop.

^b Each group of heifers bred as yearlings to produce one calf crop as 2-year-olds by these breeds.

^c Each group of cows mated to produce at least three calf crops by 3/4 or 7/8 Simmental bulls.

^d Sample of same Hereford and Angus sires used in Cycle I, Phase 1, 1969, 1970 and 1971 breeding seasons.

APPENDIX

TABLE 5. MATING PLANS TO PRODUCE CYCLE III, PHASE 2 CALVES^a

1974 and 1975 Breeding Seasons

Female Breeds ^b	Male Breeds					
	Hereford ^c	Angus ^c	Brahman	Sahiwal	Pinzgauer	Tarentaise
Hereford		X	X	X	X	X
Angus	X		X	X	X	X

^a Approximately 1600 calves will be produced from these matings with 256 heifers (32 of each breed group, except Tarentaise) located at Brooksville, Florida, and the remainder located at the U.S. Meat Animal Research Center. These F₁ heifers will be bred naturally to Red Poll bulls for their first calf-crop and to Simmental bulls for their three subsequent calf-crops.

^b Cows used for GPE Cycle I, Phase 1.

^c Sample of same Hereford and Angus sires used in Cycle I, Phase 1 1969, 1970 and 1971 breeding seasons.